



Australian Bureau of Statistics

1301.0 - Year Book Australia, 1991

ARCHIVED ISSUE Released at 11:30 AM (CANBERRA TIME) 01/01/1991

SAFEGUARDING OUR RAINFOREST HEIRLOOMS

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Although moist rainforests cover only about six per cent of the world's area, they contain well over half of the Earth's species of animals and plants.

These two bare statistics from the United Nations' World Commission on Environment and Development embody the wonder and the alarm we feel when we look at the health of our most lavish landform system - the rainforest ecosystem.

The wonder of rainforests is that they are such complex, interlocking systems that a small overall area hosts probably a minimum of five million, and maybe as many as thirty million, species of our inherited life forms.

The alarm is that we also know that somewhere between seven and ten million hectares of these supreme ecosystems are being cleared each and every year, with a further ten million hectares 'grossly disrupted'. This information comes from UN surveys done in the late 1970s. Since then the rate has accelerated, not decelerated.

What, then, is happening to our heritage of a living planet, to the marvellous variety of animals and plants handed down to us, when the key to their survival seems to lie in the very rainforests we are disfurnishing from our world at such a rate?

In Australia, we are trying to find the answer to this through new programs of conservation and balanced management of our rainforests. The need for their conservation is as urgent and necessary as anywhere in the world. The total Australian rainforest area might be small in global terms - its two million hectares represents less of an area than is uprooted in the Amazon basin each year alone - but its ratio of species to area is as impressive as that of any other rainforest. Furthermore, the Australian rainforests are unique in a number of important ways: their variety is unusual; the range of climates in which they have survived is exceptionally wide; and the number of plants and animals that are endemic to them and are still identifiable as being of very primitive stocks is scientifically exciting.

Most of the world's rainforests are found around the thin equatorial belt within such regions as the Amazon and Congo river basins, and the Indo-Malaysian region. However, there are also a surprising number of rainforest pockets that survive in quite arduous climatic conditions north and south of tropical latitudes. (This patchwork pattern of rainforests is very noticeable in Australia, where pockets occur over a surprisingly wide north-south range - from the north-west of Western Australia, down through Queensland, New South Wales, Victoria, and stretching into Tasmania.)

Unfortunately, this fragmented pattern has not helped the survival of rainforests in a world voracious for their wonderful hardwood timbers. Indeed, the collective system of rainforests is

probably more under threat than any other ecosystem in the world. This is primarily because of the current clearing practices around the world of this invaluable natural resource each year.

The potential tragedy is that, if we persist with this current rate of clearing, we could well dispossess the world totally of its rainforests by the year 2000. The effect of this on the world's genetic diversity - and in consequence, humankind's well-being--would be nothing short of catastrophic.

It is already accepted that the recent diminishing of our world stock of rainforests has been a major cause, directly or indirectly, of the extinction of more than 90 species of birds, 36 species of mammals, and an uncounted number of invertebrates in modern history - a situation that the British ecologist Dr Norman Myers considers the greatest spasm of mass extinction since life began.

After all, rainforests have been, and still are, the crucibles of our medical, agricultural and environmental welfare. In a real sense they hold the key to our genetic vault. Already this century, our scientists have used the rainforests genetic bank to improve such crops as bananas, sugar, cocoa, rubber and coffee - staple crops that are no different from any other agricultural crops in their need for consistent genetic boosts to improve yield, nutrients or disease resistance. The same is just as true for our animal sciences.

The oldest rainforests of all

It is against this vexing world-wide backdrop that the Australian Government instigated a range of initiatives designed to protect, conserve, rehabilitate and transmit to future generations environmentally - sensitive rainforest areas in the country.

Some of these programs are specific to rainforests themselves, and some impinge upon rainforests as pan of an overall approach to broader ecological issues.

Of a specific nature is the Government's listing of particular rainforest areas either on the Register of the National Estate through the Australian Heritage Commission or upon UNESCO's World Heritage List. Where applicable, too, State Governments have given selected rainforests some form of limited-use status, such as national park or some equivalent reserve status.

Three of Australia's World Heritage areas contain either a majority or a substantial part of rainforest. These are the Wet Tropics of Queensland, the Australian East Coast Temperate and Subtropical Rainforest Parks in north and central New South Wales, and the Tasmanian Wilderness. In these, Australia has committed itself to a major international treaty which obliges it to conserve, preserve and protect well over one million hectares.

There are also many projects that have general relevance to the conservation of rainforests in the wider range of government initiatives in national programs, either administered by Federal, State or local governments or through community and landholder groups.

The major arms of the Federal Government's initiatives are the National Conservation Strategy, Greening Australia (which includes the One Billion Trees program), the National Biological Diversity Strategy (which includes the Endangered Species Program, the Save the Bush Program and the environmental data base), Landcare and the Australian National Parks and Wildlife Service.

With specific regard to rainforests on a national scale, however, the Government's principal conservation vehicle is the National Rainforest Conservation Program (NRCP). Implemented in 1986, it is an overview strategy which aims at the protection of the whole of the rainforest panorama in this country and in its external territories of Christmas, Cocos-Keeling, and Norfolk

Islands.

One of the NRCP's first tasks was to identify not only the rainforest areas to be protected, but also to define what exactly a rainforest was. This was not as easy as it would seem, because very little had been done in the study of rainforest ecology, biology or zoology. There was a reason for this.

Until recently, it was thought that rainforests were somehow 'alien' to the Australian landscape. Rainforests mainly thrived in the tropical north, and seemed more suited to the Asian-Pacific image of high rainfall and humidity, and not to the hard-leaved type vegetation, like gums and wattles, which seemed so tightly 'Australian'. Therefore, the pundits speculated, rainforests must have been recent invaders across the land bridge that, in fairly recent geological times, connected this country with New Guinea.

However, the evidence quickly mounted that this could not be so. It was not just that rainforests had evidently adapted themselves to various climatic conditions (the temperate rainforests of New South Wales and the subtemperate rainforests in Tasmania) which bore witness to longer local habitation than was ever imagined. It was other irrefutable evidence, such as the discovery in north-east Queensland's Wet Tropics of no less than fourteen of the world's nineteen known families of surviving ancient angiosperms or flowering plants, and the existence of animal species older than anything that occurred in the forests of our neighbours to the north.

These ecosystems are not foreign to the Australian landscape at all. They are, in fact, older 'natives' than gum trees. They show us what the primordial rainforests of Gondwana were actually like.

But they do more than that, for it is now realised that, literally out of them, developed the vegetation of Australia today - our great acacia, eucalypt, paperbark and mangrove forests. In them are intimations of the beginnings of the marsupials, of the age of flowering plants, of the development of song birds upon the Earth and of how the continents broke apart.

Indeed, we can now acknowledge that the wet tropical rainforests of north-east Queensland are surviving fragments of actual Gondwana forests and, as such, are among the oldest rainforests on Earth.

For a long time, too, there was some confusion about the actual definition of a rainforest, since there was a considerable difference in appearance between the lush, broad-leaved coastal rainforests and those deep in the Tasmanian cool temperate wilderness, or those stunted on exposed mountain tops. Were these 'true' rainforests too?

What is a rainforest?

Whether it be a mainly deciduous monsoon rainforest or a beech-dominated cold-climate rainforest, there are obvious differences that distinguish a rainforest from other types of forests.

One of these is the closed canopy structure of an undisturbed rainforest. This can be dense, where tree crowns are tightly interlocked, or quite mottled to give a quite dappled forest floor. Whichever, the forest system is 'closed', as against being 'open' like a eucalypt woodland. And it is under this closed-canopy situation that rainforest animal and plant species grow, compete and specialise.

This canopy system is the prime cause of those other sensual rainforest characteristics, such as the continuously-high humidity, the soft light and the blunting of temperature extremes.

Then there are the characteristic plants that are rare or absent in other forest types. These

include the epiphytes, such as tree orchids; the parasites, such as the magnificent fig trees; the lianes; the variety of mosses and lichens; the ferns, vines and palms; and the trees with special life forms like buttressing of their root systems, strangler figs, flower-fruit that grow out of the trunks and not from branches.

Both the canopy and the understorey systems can be indicative of the type of rainforest they are by the number of layers of which they consist. In the warmer, moister, protected areas, a canopy might often consist of two or more layers of trees and/or a number of tree species. The cooler or higher from sea level you get, the less rich in species are the rainforests and, in consequence, the layers can be reduced to even a single layer.

Where and what type?

There is quite a large number of different types of rainforest in Australia. These occur throughout a wide geographical range, stretching in an arc from the north-west to the south-east through some 6,000 kilometres.

As varying in both structure and floristics as they seem, however, our rainforests form part of a whole that has been whittled away until only one quarter remains of what was: standing at the beginning of our European history.

A great deal of what does remain tends to inhabit steep or difficult terrains denying bulldozers the easy access that was possible to lowland and tableland rainforests. These latter types made quick way for coastal development, forestry or agriculture. So much so that if we could gather all the rainforest in Australia, we would have an area of no more than 70 kilometres in diameter on the mainland and only about 38 kilometres in diameter in Tasmania.

Broadly speaking, the rainforests in Australia range from being monsoonal (north Australia), tropical (Queensland, above 18° latitude), subtropical or warm temperate (Queensland and New South Wales, approximately between 18° and 33° latitudes), dry rainforest (New South Wales), cool temperate (Tasmania), wet sclerophyll with well-developed rainforest understorey in Victoria.

The monsoon rainforests

The monsoonal regions of north Australia are characterised by a number of different types of vine rainforests, or vine thickets.

These are generally medium-leaved systems and are distributed in generally small patches over a surprisingly wide range of country.

There are the evergreen rainforests with canopies up to 35 metres; these can change from being complex in structure around permanent water to quite simple structures in sandstone terrain. There is also the semi-evergreen or deciduous type that survives in seasonally dry conditions, such as coastal dunes.

The wet tropical rainforests

This type contains the most luxuriant communities of rainforests, especially around the wet and humid lowland areas of north-east Queensland.

In this region of rugged mountains and sweeping valleys are found the hardwood giants that have avoided the saw teeth, amongst all the wonders and colour hues of the rainforest of legends.

Characteristically, these forests have densely closed canopies that can be 40 or 50 metres above

ground. Beneath is the understorey of the smaller trees and saplings waiting for a break in the canopy. If the canopy remains undisturbed and unbroken, the forest floor will be quite bare of plants, rotting logs, litter, humus and suchlike; if incomplete, the understorey will be quite complex and competitive.

Vines, too, will vary according to disturbance or not, and to such factors as elevation, soil quality, climatic aspect and exposure. In places - where for example, the eastern slopes of the coastal range have been recently hit by a cyclone - the rainforest is so draped by the faster growing vines that it seems shrouded with a choking green web.

Yet these tropical rainforests can be differentiated from the equatorial rainforests of South America and the Indo-Malaysian regions. Even in some of the wettest country in the world, between Tully and Cape Tribulation (in north Queensland), there is a dry season each year when the rainforests will become almost parched, even to the extent of some of the trees wilting.

Indeed, it largely depends on the length of this Dry as to whether the Australian rainforest can be classified evergreen, or semi-evergreen or deciduous. Apart from these two broad divisions, rainforest communities are further classified as to whether they are complex or simple in structure; large-leaved, medium-sized-leaved, or small-leaved; ferny or vines according to rainfall, drainage, soil fertility, shelter, and height above sea level.

Because of the vast changes to all these factors in such a rugged and mountainous terrain, there has evolved no less than 13 broad categories, further divided into 27 communities in the north-east region of Queensland.

The subtropical rainforest

This rainforest is the major rainforest form that occurs on fertile soil under fairly high rainfall and moderately warm temperatures. It has two basic types: warm subtropical rainforest and cool subtropical rainforest.

Warm tropical rainforests suffered greatly through clearing for development over the decades, because it best developed along the lush alluvial coastal plains. Cool subtropical rainforests occur on higher altitudes, generally, but contain fewer species of animals and plants.

Both types have medium-to-large leaf sizes and characteristically show strangling figs, palms, large woody vines, epiphytes and stem buttressing. These are widespread in south Queensland and northern New South Wales.

An unusual derivative of the subtropical rainforests is the littoral rainforest. Small stands of this occur on coastal headlands and sand dunes. In relatively sheltered places, it grows as low, dense, wind-sheared thicket.

The dry rainforests

The 'dry' rainforests are also known as Araucarian notophyll vine forests or semi-evergreen vine thicket forests, and are generally found on fertile soils under drier conditions. They are of fairly simple structure, normally with two distinct tree layers - a lowish closed canopy above which is a sweep of higher emergents not generally recognised as rainforest trees. Some of these emergents are likely to be such trees as hoop pine, lace bark, teak, ash, silky oak, fig and koda.

You won't find many palms or epiphytes like orchids in these forests, but large vines are fairly common. Mosses and ferns can be scarce in one patch, but quite common in another, especially if it is a cool, montane environment.

The warm temperate rainforests

These are also known as simple notophyll (medium-size) vine-fern forests. They are generally more simple in structure and species than the subtropical rainforests.

Frequently, the canopy is of only one or two emergent species with medium-to-small leaf size. There is very little buttressing of the root system and most of the trees, many of them coachwood, have slender trunks. There is very little visual evidence of palms or woody vines or orchid-like epiphytes. However, small, wiry vines are quite common as are ferns, lichens and mosses.

A characteristic of these types of rainforests is the white ghostly look of the tree trunks. This is caused by the great abundance of epiphytic lichens.

Warm temperate rainforests have a wide north-south area of distribution, from the Atherton Tableland in north-east Queensland right down to East Gippsland in Victoria. They are generally found on higher ground and in poorer soils than subtropical rainforests in the north, but tend towards better soils at lower altitudes at the southern stretches of their range.

The cool temperate rainforests

These are small-leaved (microphyll) moss or fern forests. Their northern range is from the Lamington Plateau in southern Queensland, extending through New South Wales and Victoria to the wilderness of Tasmania.

These communities have an even more simple structure and are normally associated with a single species occupying whole areas of canopy. Even at the lower levels, there tend to live only a few species. Palms are rarely seen, but ground ferns, mosses and lichen are plentiful.

A major characteristic of cool temperate rainforests is the prevalence of tree ferns (particularly the well-known soft tree fern), and the occurrence of antarctic beech and pinkwood. Here, delicate growths of rich green cloak damp rocks or drape their long curly tangles over tree branches.

In Tasmania, rainforest is usually defined as a system with trees higher than eight metres and dominated by such species as myrtle-beech, sassafras, celery-top pine and King Billy Pine.

Cool temperate rainforests are entirely evergreen, the deciduous dwarf beech being the only exception. This endures in Tasmania, where, in late autumn, it throws its stunning red, gold and orange display against the backdrop of icy highland lakes and towering mountains.

The wet sclerophyll forests

These are forests that have eucalypts as canopy trees, but whose understorey is comprised mainly of well-developed rainforest plants. They occur mainly in Victoria and Tasmania.

This association of sclerophyll and rainforest types is a curious one that relies upon opportunity, rather than on a competitive basis. For example, as wet sclerophyll forests mature, the eucalypt emergents gradually become more sparse and are replaced by rainforest trees.

At this stage, these forests are called mixed forests. In fact, if nature or man left them undisturbed, it would be seen that the mixed-forest stage is a midpoint in the evolution of the forests' becoming full rainforests, with all the eucalypts being displaced. For one thing, the shade-intolerant eucalypt seedlings just cannot survive rainforest competition.

This evolvement only rarely comes to fruition over the ages, and, basically, the reason for this is fire. Whether infrequent wildfire or fire planned regime by humans, fire destroys the rainforest plants and encourages the eucalypts. The forests then return to the point on a continuous pendulum swing we call 'wet sclerophyll', with eucalypts in dominant vitality.

They then begin to age; the rainforest species begin to reassert themselves in undisturbed conditions; and the pendulum moves the other way. If fires are too infrequent, the eucalypts will die out and the system becomes rainforest. If natural or man-made fires are too frequent for rainforest recovery, the forests will remain wet sclerophyll - or even become open woodland.

The push-pull with associated forests

In fact, this pendulum swing of rainforest dominance over, and subordinancy to, neighbouring forests has been a feature of the remarkable survival of the Australian rainforest remnants.

Looking back to the time when it broke away from what was left of Gondwana some 90 million years ago, the Australian continent became a kind of life raft for rainforests, because it drifted northwards to warmer climates at the same time as the world was cooling. In this way, the Australian rainforests were sheltered from what might have been disastrous falls of temperature.

In more recent geohistorical times, the rainforests were able to survive the last great ice age (which lasted until only about 8,000 years ago) by being able to retreat into sheltered, well-protected refuge areas, or what are referred to as refugia. It was out of these refugia that the rainforest expanded when conditions become favourable again, perhaps because of fewer fire surges or local climate warming. And it was back to the refugia that they contracted when conditions favoured the eucalypt-type or pine-type systems.

Here was, and still is, a natural push-pull cycle with their traditional forest neighbours - a vital concomitancy that is the natural order of things and which came to be mutually beneficial.

We might try to define a rainforest in botanical terms, but, for the animals which move from rainforest to bordering sclerophyll or mangrove forest, the definition is meaningless. Even for survival of the rainforest plants, their system's close affinities with neighbouring systems can be life-necessary. Fire, for example, can do irreparable damage to a healthy rainforest; yet, if that rainforest is surrounded by a fire-liking sclerophyll forest, then what would have been a devastating blaze will be likely to follow the 'tinder path' of the latter, rather than irreparably wound the rainforest.

Traditionally associated forestal systems, then, are of vital importance to not only the health, but also to the very survival of the rainforest systems and their animals and plants. These are the tall, open sclerophyll forests, the open woodlands, the mangrove forests, the melaleuca or paperbark swamps. They form life-supporting corridors into and around the rainforests, which may mitigate the effects of fire, or be home to a species' particular seed-disperser, and so forth.

They are also part of the rainforests' domains through expansion, just as much as the rainforests are part of their domains through contractions. All are interdependent, and all therefore have to be looked at in relationship to rainforest welfare through conservation measures.

It is because of such factors that, for example, the Wet Tropics World Heritage Area of Queensland incorporates sclerophyll, mangrove and paperbark systems that make up one-third of its total 9,000 square kilometres. The associated forests are important to the very health of rainforests there; without them the Wet Tropics rainforests, as a composite living organism, would have been exposed and vulnerable - as indeed would have many of their living inhabitants which exist along the blurred lines of their margins.

It is also why some of the projects funded by the National Rainforest Conservation Program are ones which, on the surface, might seem to have only a tenuous connection to actual rainforest salvation.

The National Rainforest Conservation Program - NRCP

Very soon after the extent, variety and vulnerability of Australia's rainforest mosaic became scientifically evident, the Government moved to cast a protective screen over this valuable national resource.

In 1986, it announced its primary weapon against further degradation as the NRCP by allocating \$22.25 million not only to preserve rainforests, but also to conserve them in a way that took account of their ecological, genetic, cultural, natural heritage, scientific, economic and recreational values.

The Program arose out of the recognition that diminishing rainforests had been the cause of much friction across all levels of society in previous years. Without an agreed strategy, confrontations between economic-health and environmental-welfare proponents were likely to continue.

One result of this realisation was the conference which the Government convened in Cairns in 1984 to uncover the range of community attitudes towards conservation of our tropical and subtropical rainforests. By recognising the need for rainforest protection through Commonwealth policy, the meeting clearly demonstrated that a cooperative approach to rainforest sustainability was indeed possible.

The outcome of this was a Working Party comprising officers from most State and Federal environmental agencies, together with representatives from the relevant peer groups from the private sector. The Group presented its landmark report - a crystallisation of previously disparate and intractable viewpoints - in September 1985. Here, for the first time in matters of rainforest protection, the Government had an agenda of possible and practical policy options that could be undertaken. This was the sapling from which the National Rainforest Conservation Program grew.

Through the Program, the Government wanted to engender specially-funded projects involving research, surveys, rehabilitation, land acquisition, visitor centres and public information.

With the participation of Queensland in 1990, the Program now covers all Australian States and Territories, including external Territories. The projects range from the large-scale to the small-scale, from involving a local community in conserving local rainforest patches to studying the interaction between flying foxes and the rainforests, from boardwalks for the disabled to major educational information centres.

Almost 200 projects have been funded since the establishment of the Program, and of them, perhaps the saving of the rainforest patch within the limits of the town of Robertson, New South Wales, might be most typical.

The saving of Robertson's rainforest

Robertson is a small town in the Illawarra region of New South Wales. It is a proud and elegant centre, visited by many people each year, and not the least for its potatoes, cheese and pie shop.

Within the actual town limits is a small five hectare patch of rainforest, called Robertson Nature Reserve, which, together with a few other patches on nearby private land, is all that is left of a once extensive 2,500 hectare stretch of both warm and cool temperate rainforests, known as the

Yarrowa Brush.

With the funding help of the NRCP, the NSW National Parks and Wildlife Service got together with the local people to form a bush regeneration group within the town. The primary object of the group was to save the central remaining section and to encourage the local land owners to take measures for the other remnants against grazing and exotic-weed depredations.

Meeting regularly to plan, to weed and to carefully restore the degraded areas of the reserve, the group managed to turn around the catabolism of this isolated rainforest remnant to such an extent that, in 1989, they won the coveted 'natural areas managed by Government Authority' section in the State's Tidy Towns Competition.

The cooperation at all levels proved such a success that the NRCP gave further funding to enable access and education of the reserve for all people. A 600 metre loop track was installed with wheelchair access in mind; then interpretative signs were posted and leaflets printed to explain the natural features. Nor did the group forget the importance of the landowners; for them, it produced a pamphlet on the best ways to regenerate their rainforest islands.

The loss of the Yarrowa Brush has been averted.

Of course, it matters that only a small proportion of its one-time glory stands as its monument. But that is better than nothing. The little that is left is also a monument to the changing social attitudes that now put a high priority on avoiding the destruction, or at worse, the impassive neglect, of our land's living bounty of rainforests.

And that, with due governing equilibrium, is what the National Rainforest Conservation Program, as a major national conservation tool, exemplifies.

This page last updated 18 June 2009

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